
Geastrum wrightii

Fungal Planet 1014 – 18 December 2019

Geastrum wrightii J.C. Zamora, Dios, G. Moreno, Hern. Caff. & L.S. Domínguez, *sp. nov.*

Etymology. Named after Jorge E. Wright, Argentinian mycologist who contributed to the study of numerous neotropical gasteroid fungi, including the genus *Geastrum*.

Classification — *Geastraceae*, *Geastrales*, *Phallomycetidae*, *Agaricomycetes*, *Agaricomycotina*.

Immature basidiomata not seen. Mature *basidiomata* reaching 4 cm diam and 2.5 cm high (including the peristome). *Exoperidium* opened in 6–9 not truly hygrometric rays, but with tips that may be either involute or curved under the exoperidial disk. *Mycelial layer* densely encrusting debris, bistratificate, with the external part formed by hyaline to pale yellowish, skeletal hyphae with inconspicuous lumen, and the internal part with hyaline, thin-walled, clamped, generative hyphae, difficult to distinguish. *Fibrous layer* coriaceous, cream-coloured to brownish, formed by yellowish skeletal hyphae with a ± distinct lumen. *Pseudoparenchymatous layer* pale cream at first, soon becoming brownish, around 1 mm thick when fresh, less than 0.5 mm thick when dried, slightly thicker towards the stalk, not persistent in old basidiomata, formed by thin-walled inflated cells of variable size and shape, up to about 40 µm wide, smaller towards the fibrous layer. *Mesoperidium* as a pale cream farinaceous cover over the endoperium in young basidiomata, formed by small calcium oxalate dihydrate crystals (≤ 12 µm diam) and some generative hyphae. *Endoperidial body* prominently stalked, subglobose-applanate to almost disc-like, up to 1.5 cm diam; endoperidium brown to blackish, glabrous, sometimes with distinct concentric grooves in the upper half and radial grooves in the lower half showing the hyphal arrangement, farinaceous when young due to the mesoperidial cover, formed by brownish skeletal hyphae with distinct lumen. *Peristome* plicate, 2–4 mm high, with 14–20 folds, conical, not delimited to ± distinctly delimited, dark brown. *Apophysis* very well developed, ring-like, with a solid and an acute edge. *Stalk* 2–4 mm long, brownish. *Columella* damaged in the studied sporocarps, but intruding at least 1/2 into the glebal mass. *Gleba* dark brown to blackish. *Capillitium* formed by yellowish brown to brownish skeletal hyphae, the broadest about 4–5.5 µm diam, thick-walled (up to 2.5 µm thick), with visible lumen, unbranched; surface smooth or sometimes covered with irregular debris. *Basidiospores* globose to subglobose, 4–5(–5.5) µm diam, verrucose, brownish yellow under the compound microscope. Basidiospore ornamentation under the scanning electron microscope well-defined, up to 0.8 µm in height, irregularly baculate, generally isolated or forming short crests, tending to be radially arranged around the hilar appendix.

Colour illustrations. Argentina, Dpto. Paclin, La Merced, ecotone between the Yungas forest and the Chaco Serrano, where the holotype was collected. Detail of a basidioma and basidiospores under the SEM, AH 49090 (holotype); detail of basidiomata and basidiospores under the SEM, MLHC 526 (paratype). Scale bars = 1 cm (basiomata), 1 µm (basidiospores).

Habitat & Distribution — Growing solitary to gregarious among vegetal debris, in mixed broadleaf forests. Only known from the Humid Chaco (tropical and subtropical grasslands, savannas and shrublands biome) and the ecotone between the Southern Andean Yungas (tropical and subtropical moist broadleaf forests biome) and the Chaco Serrano (tropical and subtropical dry broadleaf forests biome) (Olson et al. 2001).

Typus. Argentina, Catamarca, Dpto. Paclin, La Merced, close to the tunnels entrance, on humus in mixed forest, in ecotone with the Chaco Serrano/Yungas, May 2009, *M.M. Dios 589* (holotype AH 49090, isotype BAFC 52280, ITS, 28S nrDNA, *RPB1* and *ATP6* sequences GenBank MK732525, MK732526, MK732533 and MK732530, MycoBank MB832754).

Additional materials examined. Argentina, Chaco, Dpto. Sargento Cabral y Presidencia de la Plaza, Parque Nacional Chaco, on humus in mixed forest with *Aspidosperma quebracho-blanco* as a dominant species, 5 May 2010, *L. Hernández Caffot* MLHC 526 (CORD, ITS/28S nrDNA, *RPB1* and *ATP6* sequences GenBank MK732527, MK732534 and MK732531); ibid., MLHC 1903 (CORD, ITS/28S nrDNA, *RPB1* and *ATP6* sequences GenBank MK732528, MK732535 and MK732532).

Notes — The morphological description is based on nine sporocarps from three specimens, and consequently, we expect a much larger intraspecific variation. Intense surveys were conducted during several years to collect additional samples, but without success, so the species appears to be rare. *Geastrum wrightii* belongs to *G.* subsect. *Sulcostomata* (Zamora et al. 2014), and is macromorphologically very close to *G. striatum*, sharing the very unusual solid, ring-like apophysis under the endoperidium. Both species can be morphologically distinguished by the basidiospore size and colour, 4–5(–5.5) µm and brownish yellow in *G. wrightii*, vs 5–6(–6.5) µm and distinctly brown in *G. striatum*. In addition, the ecology and distribution are different, since confirmed records of *G. striatum* s.str. are only known from temperate areas of the Northern Hemisphere. One specimen of *Geastrum* aff. *striatum* (AH 18521) from Mexico shares the small basidiospore size, but the stalk of the endoperidium is much stouter and shorter, and the apophysis less marked, with a blunt edge, as explained in detail by Zamora et al. (2015).

The three studied specimens of *G. wrightii* form a fully supported clade in our multilocus phylogeny, with both *G. striatum* s.str. and *G.* aff. *striatum* from Mexico being well-separated. The three known species in the *G. glaucescens* group (*G. glaucescens*, *G. papinuttii* and *G. parvistriatum*) are also clearly distinct based on molecular data of the analysed DNA regions, and are further characterised morphologically by the absence of a sharp ring-like apophysis.

Supplementary material

FP1014 Fifty percent majority-rule Bayesian phylogram for the *G. striatum* and *G. glaucescens* groups, obtained in MrBayes v. 3.2 (Ronquist et al. 2012), using the settings indicated in Zamora et al. (2017). Statistical support on the branches means posterior probabilities from the Bayesian analysis, and bootstrap values based on 1 000 non-parametric replicates in IQ-Tree (Nguyen et al. 2015).

Juan Carlos Zamora, Museum of Evolution, Uppsala University, Norbyvägen 16, SE-75236 Uppsala, Sweden, and Departamento de Biología Vegetal II, Facultad de Farmacia, Universidad Complutense de Madrid, Ciudad Universitaria, plaza de Ramón y Cajal s/n, E-28040, Madrid, Spain; e-mail: jcsenoret@gmail.com
Maria Martha Dios, Departamento de Biología, Facultad de Ciencias Exactas y Naturales, Universidad Nacional de Catamarca, Av. Belgrano 300, San Fernando del Valle de Catamarca, Catamarca, Argentina; e-mail: mariamartha011@hotmail.com
Gabriel Moreno, Departamento de Ciencias de la Vida (Área de Botánica), Facultad de Ciencias, Universidad de Alcalá, E–28805 Alcalá de Henares, Madrid, Spain; e-mail: gabriel.moreno@uah.es
María Luciana Hernández Caffot, Instituto de Ecorregiones Andinas (INECOA), CONICET-Universidad Nacional de Jujuy, CP 4600, San Salvador de Jujuy, Jujuy, Argentina; e-mail: lhernandezcaffot@hotmail.com
Laura S. Domínguez, Laboratorio de Micología, Instituto Multidisciplinario de Biología Vegetal, CONICET, Universidad Nacional de Córdoba, CC 495, 5000, Córdoba, Argentina; e-mail: lausudom@gmail.com